City of Milpitas

NOISE ELEMENT

Adopted by City Council on August 15, 1989

prepared by:
Charles M. Salter Associates, Inc.
and
City of Milpitas Planning Division

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CITY OF MILPITAS
NOISE ELEMENT

PURPOSE OF THE NOISE ELEMENT

This Noise Element of the City of Milpitas General Plan describes the Milpitas noise environment and provides the basis for local programs to reduce and control environmental noise. The fundamental goals of the Noise Element are to:

o Maintain land use compatibility with noise levels similar to those set by State guidelines

o Minimize unnecessary, annoying, or injurious noise

STATE GUIDELINES AND REQUIREMENTS

The requirements for noise elements are established in California Government Code Section 65302(f) which states:

> "A noise element shall identify and appraise noise problems in the community."

The Code further requires that other State guidelines be considered and that current and projected noise levels be developed for roadway, railroad, aviation, industrial, and other noise sources identified by local agencies. Noise exposure contours are to be "used as a guide for establishing a pattern of land uses in the Land Use Element that minimizes the exposure of community residents to excessive noise". The Noise Element must also "include implementation measures and possible solutions [to] existing and foreseeable noise problems" and provide a basis for compliance with the State's noise insulation standards.

<u>NOISE CRITERIA</u>

The Noise Element for the City of Milpitas is an integral part of the General Plan and has been prepared from information developed from the Land Use and Circulation Element of the Plan. The Noise Element projects growth in noise exposure from traffic growth throughout the City of Milpitas. The results from the Noise Element are utilized with the Land Use and Circulation Element to identify existing and future land use compatibility issues. Table A identifies recommended noise compatibility criteria for the City of Milpitas to be used in defining the degree of noise impact, the feasibility for noise mitigation, and for project permit approval. These criteria are the same as those contained in the State "Guidelines for the Preparation and Content of Noise Elements".

The "day-night" sound level (DNL or Ldn) used in this Element represents a sound level that is equivalent to the total varying sound levels that occur over a 24 hour period <u>plus</u> a 10 decibel (dB) penalty for nighttime noise (i.e. between 10 pm and 7 am). Appendix "A" is a discussion of the fundamentals of environmental noise for those unfamiliar with the subject. The DNL noise descriptor has been chosen in lieu of the NEL descriptor because it is now preferred in the State building code, CAC Title 24 (although CNEL is still acceptable since it is normally within 0.5 dB of the DNL value). Appendix "B" provides more detailed information on the development of the noise exposure contours.

TABLE A

Land Use Compatibility Guidelines for Community Noise Environments

Exterior Day/Night Sound Level (DNL), decibels

Land Use Category	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Single-Family residential	50-60	55-70	70-75	75+
Multi-family residential	50-65	60-70	70-75	75+
Lodging	50-65	60-70	70-80	80+
Schools, Libraries, Churches, Nursing Homes	50-70	60-70	70-80	80+
Hospitals	50-70	60-70	70-80*	*
Auditoria, Concert Halls	to 50	50-70	65+	**
Outdoor Spectator Sports	to 50	50-75	70+	**
Parks and Playgrounds	50-70	**	67-75	72+
Outdoor participatory sports,	50-75	**	70-80	80+
Offices, commercial and professional buildings	50-70	67-77	75-85	**
Industrial areas, agriculture	50-75	70-80	75+	**

1: Normally Acceptable - Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

2: Conditionally Acceptable - New construction or development should be undertaken only after a detailed analysis of the noise reduction requirement is made and needed noise insulation features included in the design.

3: Normally Unacceptable - New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

4: Clearly Unacceptable - New construction or development clearly should not be undertaken.

*Because hospitals are often designed and constructed with high noise insulation properties, it is possible for them to be satisfactorily located in noisier areas.

**State guidelines do not specify the degree of acceptability for the particular land use category.

NOISE IMPACT

The existing noise exposure throughout Milpitas is dominated by traffic and rail operations.

Assuming that there will be no significant change in the General Plan "build-out" land use scenario with respect to the proportion of noise generating land uses, future noise exposure impacts will be very similar to that found for the existing conditions, since the increase in noise exposure during future years is minimal. The net effect is to increase the width of noise contours along the freeways.

NOISE EXPOSURE CONTOURS

In establishing noise contours for land use planning, it is customary to ignore the noise attenuation afforded by man-made structures, roadway elevations, and depressions, and to minimize the barrier effects of natural terrain features. This is done, for planning purposes, to provide a conservative estimate of the future noise environment.

The purpose of the noise contours is to identify the potential need for more detailed acoustical analyses, not to precisely predict noise levels throughout Milpitas. It is preferable to overestimate the potential noise at a future sensitive development site, rather than underestimate the noise environment and allow for potentially incompatible land use development. Man-made barriers such as buildings may be removed as a part of development, thereby providing no future noise attenuation. The noise contours for the existing (1988) and land use build-out situations are shown on Figures 1 and 2.

The noise exposure contours may be examined with respect to the City land use zoning map to identify areas of potential incompatible land use per Table A. This incompatibility is not absolute due to the conservative nature of the contours and the change in land use by adjacent individual lots.

NOISE MITIGATION

Noise mitigation measures fall into two general categories: physical mitigation and administrative regulation. physical mitigation measures include enclosing the noise source, substitution of a quieter noise source, or use of a noise barrier. Administrative regulation, on the other hand, reduces noise exposure by limiting operation of the noise source or by regulating locations where it may be used. Generally, physical noise mitigation measures reduce the level of noise produced, whereas administrative measures limit the duration of the noise, thereby reducing noise exposure. A combination of physical and administrative mitigation measures are appropriate for Milpitas.

Physical mitigation measures for traffic noise are construction of sound walls along noise-sensitive areas, use of earth berms and revetments, and routing of new roads to circumvent noise-sensitive areas. Administrative regulation of traffic noise includes restricting truck access routes, enforcement of speed limits, and enforcement of State vehicle noise emission standards.

For new construction, noise control should be incorporated into the design. Specific recommendations depend upon the type of construction, character of the noise exposure, and degree of noise reduction required for interior and outdoor areas. These recommendations must be provided by a registered professional engineer experienced in acoustics. Typical noise mitigation alternatives include:

- o Building location and orientation with respect to noise sources

- o Special window glazing

- o Mechanical ventilation systems

- o Building materials and construction details.

Retrofit noise treatment of existing buildings may also effectively control interior noise exposure. This treatment also requires an engineering assessment of the particular struction and noise environment. Such treatment may include:

- o Replacement of doors and windows
- o Central ventilation systems
- o Sealing of ventilation openings.

NOISE CONTROL POLICIES, STANDARDS AND PROGRAMS

In support of City goals on noise exposure, the following noise control policies for the City of Milpitas are established:

- o To document the existing and future noise environments throughout the City and its sphere of influence
- o To establish land use compatibility criteria
- o To identify community noise problems
- o To outline noise mitigation alternatives.

In order to effect these policies, the following noise control standards and programs have been developed which may be implemented by appropriate City agencies:

- o Require that new projects meet appropriate exterior noise exposure standards. The land use compatibility guidelines in Table A define the need for further acoustical analyses, development of noise mitigation measures, or rejection of a proposed project.
- o Reduce the noise impact in existing residential areas where feasible. Noise mitigation measures should be implemented with the cost shared by public and private agencies and individuals.

- o Ensure compliance with State interior noise exposure standards for multi-family housing. The City will approve multi-family housing development only when it meets the State interior 45 DNL noise standard. Furthermore, this standard is extended to also apply to new single-family residential development. Note that it will be unacceptable to use open windows to satisfy ventilation requirements if this would cause exceedance of the interior 45 DNL standard.

- o Control noise at the source wherever possible through enforcement of an effective City noise ordinance and review of proposed developments for noise compatibility.

- o Noise-sensitive land uses such as schools, libraries, churches and convalescent homes will be protected whenever possible from noise exposure exceeding the Table A criteria. New noise-producing facilities which may be introduced near these sensitive land uses will be evaluated for impact prior to approval.

- o Use of truck routes established by the City will be enforced. Truck noise complaints by residents will be recorded.

- o City streets will be designed to reduce noise levels to adjacent areas. This is most effectively implemented through traffic engineering to prevent residential streets from becoming rush-hour thoroughfares, and through enforcement of speed limits. Physical mitigation measures, such as sound walls, will also be considered, where appropriate.

- o The City should work closely with CalTrans on traffic and railroad noise issues and participate in appropriate noise mitigation programs.

- o A biennial noise monitoring program will be established to measure 24-hour noise exposure at two locations, and shorter-duration exposure at six additional locations. The locations will be selected by the City Planning Division in response to current concerns.

- Regulate plans and projects which may increase noise levels or be exposed to noise levels in excess of the "acceptable" levels indicated in Table A Guidelines.

- Require an acoustical analysis for projects located within a "conditionally acceptable" or "normally unacceptable" noise exposure area. Require mitigation measures to reduce noise to acceptable levels.

- Prohibit new construction where the noise exposure is considered "clearly unacceptable" for the use proposed.

- Require a maximum interior DNL of 45 dB for all habitable rooms within new residential or other noise-sensitive projects (e.g. schools, hospitals, churches,etc.). Such structures must provide mechanical ventilation systems where open windows would result in DNL noise exposure above 45 dB.

- Protect noise-sensitive land uses from noise-producing projects by requiring adequate mitigation at the noise source. Discourage the location of noise-sensitive land uses within areas exceeding "normally acceptable" levels (refer to Table A).

- Promote installation of noise barriers along highways and the railroad corridor where substantial land uses of high sensitivity are impacted by unacceptable noise levels.

- Adopt and enforce a noise ordinance which prohibits noise which is disturbing or injurious to neighbors of normal sensitivity, making such activity a public nuisance.

- Restrict the hours of operation, technique, and equipment used in all public and private construction activities to minimize noise impact. Include noise specifications in requests for bids and equipment information.

- Incorporate acoustical site planning into the design review of all residential development projects that are not in a "normally acceptable" noise environment to minimize noise impact.

- Prohibit rear yard and exterior common open space DNL noise exposure in excess of "normally acceptable" levels for single-family and multi-family residential projects. Require incorporation of necessary mitigation measures into project design to reduce rear yard and exterior common open space noise to acceptable levels.

- Minimize noise impacts on neighbors caused by commercial and industrial projects.

- Avoid residential DNL exposure increases of more than 3 dB or more than 65 dB at the property line, whichever is more restrictive.

Appendix A

Fundamental Concepts of Environmental Noise

FUNDAMENTAL CONCEPTS OF ENVIRONMENTAL NOISE

Background

Three aspects of environmental noise are important in determining subjective response:

- o Level (i.e., magnitude or loudness) of the sound.
- o The frequency composition or spectrum of the sound.
- o The variation in sound level with time.

Airborne sound is a rapid fluctuation of air pressure and local air velocity. Sound levels are measured and expressed in decibels (dB) with 0 dB roughly equal to the threshold of hearing.

The frequency of a sound is a measure of the pressure fluctuations per second measured in units of hertz (Hz). Most sounds do not consist of a single frequency, but are comprised of a broad band of frequencies differing in level. The characterization of sound level magnitude with respect to frequency is the sound spectrum. A sound spectrum is often described in octave bands which divide the audible human frequency range (i.e., from 20 to 20,000 Hz) into ten segments. Figure A-1 shows a range of sound spectra for various types of sound over the audible hearing range.

Frequency Weighting

Many rating methods exist to analyze sound of different spectra. The simplest method is generally used so that measurements may be made and noise impacts readily assessed using basic acoustical instrumentation. This method evaluates all frequencies by using a single weighting filter that progressively de-emphasizes frequency components below 1000 Hz and above 5000 Hz. This frequency weighting, shown in Figure A-2, reflects the relative decreased human sensitivity to low frequencies and to extreme high frequencies. This weighting is called A-weighting and is applied by an electrical filter in all U.S. and international standard sound level meters. Some typical A-weighted sound levels are shown in Figure A-3.

Noise Exposure

Although a single sound level value may adequately describe environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise is produced by many distant noise sources which produce a relatively steady background noise having no identifiable source. These distant sources change gradually throughout the day and include traffic, wind in trees,

and industrial activities. Superimposed on this slowly varying background is a succession of identifiable noise events of brief duration. These include nearby activities such as single vehicle passbys or aircraft flyovers which cause the environmental noise level to vary from instant to instant.

Statistical noise descriptors were developed to describe the time-varying character of environmental noise. "L_{10}" is the A-weighted sound level exceeded during ten percent of a time period, and is a good measure of the maximum sound levels caused by discrete noise events. "L_{50}" is the A-weighted sound level exceeded 50 percent of a time period; it represents the median sound level. The "L_{90}" is the A-weighted sound level exceeded during 90 percent of a time period, and describes the background noise.

Because it is cumbersome to quantify the noise environment with a set of statistical descriptors, a single number called the equivalent sound level or L_{eq} is used. The L_{eq} is the constant sound level which would contain the same acoustical energy as the varying sound level, during the same time period. The L_{eq} is particularly useful in describing the subjective change in an environment where the source of noise remains the same while there is change in the amount of activity. Widening a road or increasing traffic are examples of this situation. Because of the way sound levels combine, L_{eq} values are generally closer to L_{10} values than to L_{50} values.

<u>Daily Noise Exposure</u>

In determining the daily measure of environmental noise, it is important to account for the difference in human response to daytime and nighttime noise. During the nighttime, exterior background noise levels are generally lower than in the daytime. Most household noise also decreases at night, and exterior noise intrusions become more noticeable. People are more sensitive to noise at night than during other periods of the day.

To account for human sensitivity to nighttime noise, the DNL (or L_{dn}) descriptor was adopted by the Environmental Protection Agency to describe environmental noise exposure from all sources. The DNL is called the day-night sound level, and represents the 24-hour A-weighted equivalent sound level with a 10-dB penalty added for the nighttime noise between 10:00 pm to 7:00 am. California has traditionally used the CNEL (i.e., Community Noise Equivalent Level) daily noise exposure measure, but is currently transitioning to the DNL standard for conformance with Federal standards. The CNEL is computed identically to the DNL but with the addition of a 5-dB penalty for evening (i.e., 7:00 pm to 10:00 pm) noise. The CNEL value is typically less than 1 dB above the DNL value.

Subjective Response to Noise

The effects of noise on people can be classified into three general categories:

- o Subjective effects of annoyance, nuisance, dissatisfaction.
- o Interference with activities such as speech, sleep, and learning.
- o Physiological effects such as anxiety or hearing loss.

The sound levels associated with environmental noise usually produce effects only in the first two categories. No universal measure for the subjective effects of noise has been developed, nor does a measure exist for the corresponding human reactions from noise annoyance. This is primarily due to the wide variation in individual noise annoyance thresholds over time.

An important factor in assessing a person's subjective reaction is to compare the new noise environment to the existing noise environment. In general, the more a new noise exceeds the existing, the less acceptable it is. Therefore, a new noise source will be judged more annoying in a quiet area than it would be in a noisier location.

With regard to increases in noise level, knowledge of the following relationships will be helpful in understanding how changes in noise and noise exposure are perceived.

- o Except under special conditions, a change in sound level of 1 dB cannot be perceived.
- o Outside of the laboratory, a 3-dB change is considered a just-noticeable difference.
- o A change in level of at least 5 dB is required before any noticeable change in community response would be expected.
- o A 10-dB change is subjectively heard as an approximate doubling in loudness, and almost always causes an adverse community response.

Combination of Sound Levels

Because we perceive both the level and frequency of sound in a non-linear way, the decibel scale is used to describe sound levels. The frequency scale is also measured in logarithmic increments. Decibels, measuring sound energy, combine in a peculiar manner. A doubling of sound energy (for instance, from two identical automobiles passing simultaneously) creates a 3-dB increase (i.e., the resultant sound level is the sound level from a single passing automobile plus 3 dB). The rules for decibel addition used in community noise prediction are:

- If two sound levels are within 1 dB of each other, their sum is the highest value plus 3 dB.

- If two sound levels are within 2 to 4 dB of each other, their sum is the highest value plus 2 dB.

- If two sound levels are within 5 to 9 dB of each other, their sum is the highest value plus 1 dB.

- If two sound levels are greater than 9 dB apart, the contribution of the lower value is negligible and the sum is simply the higher value.

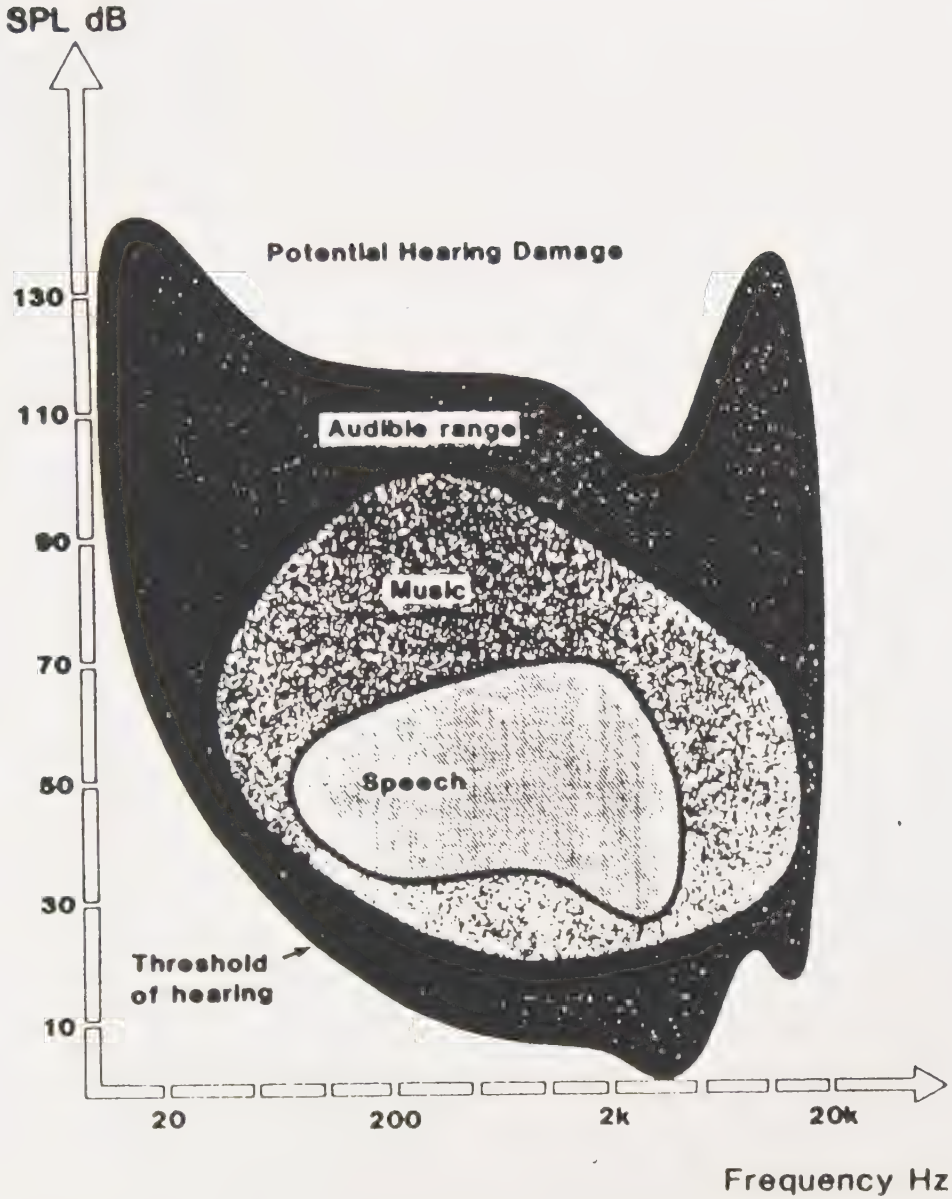


FIGURE A1 RANGE OF SOUND SPECTRA

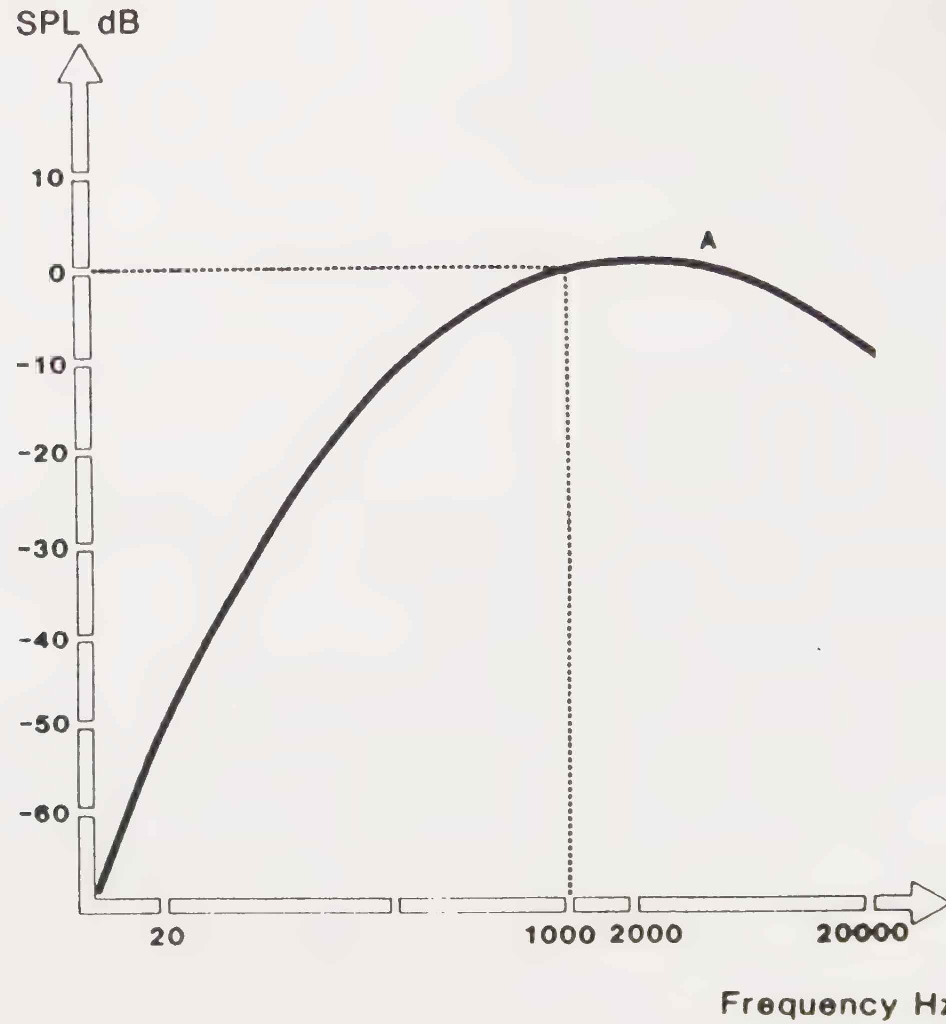
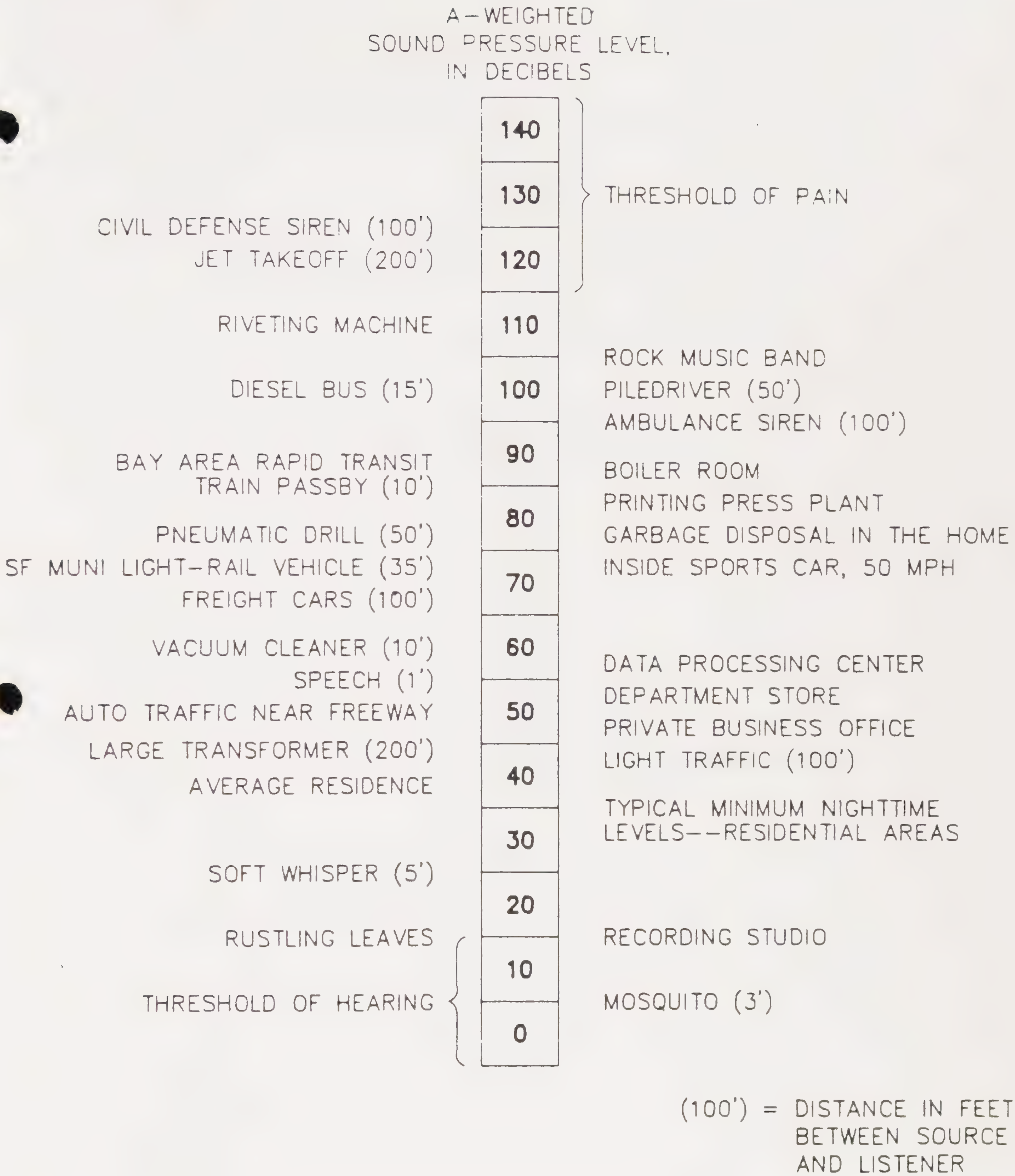


FIGURE A2 A-WEIGHTING NETWORK



TYPICAL SOUND LEVELS MEASURED IN THE ENVIRONMENT AND INDUSTRY

FIGURE A3

APPENDIX B

NOISE MEASUREMENT SURVEY

NOISE MEASUREMENT SURVEY

A comprehensive noise survey was performed on June 27-29, 1988 to accurately and reliably define the noise environment throughout Milpitas. This survey was comprised of three continuous 24-hour measurements supplemented by 13 shorter-duration measurements at locations throughout the City. The survey results document the existing noise environment and provide data for modeling future noise. Following is a description of the monitoring and measurement elements of the noise survey.

- A continuous noise-monitoring program was conducted throughout a 24-hour weekday period in the vicinity of four major transportation corridors. The information from the noise-monitoring program provides the magnitude and variation in noise levels throughout typical 24-hour periods.

- Shorter-duration measurements were conducted at 11 additional locations to document the extent of noise exposure in other areas of interest. These locations document noise sources such as major arterials, commercial and industrial areas, and noise-sensitive receiver locations such as residential areas, parks, and schools. Measurements were used to identify the levels of noise typically encountered in sensitive areas, and will define the extent of noise impact.

The noise-monitoring results quantify the relative variation in noise level from each of the major noise sources throughout a 24-hour period. The shorter-duration measurements define the magnitude of noise exposure at a particular time. The variation in noise level, quantified by the continuous monitoring, was applied to the shorter-duration measurements to develop the 24-house noise exposure DNL values at critical areas throughout the City. The noise monitoring equipment provides summary statistical information on an hourly basis, documenting the variation in noise exposure over the recording period.

NOISE EXPOSURE CONTOURS

Traffic Noise Contours

All traffic noise contours utilize the "FHWA Highway Traffic Noise Prediction Model" (FHWA-RD-77-108) for constant speed highway traffic. This model is a national standard which has evolved over more than 20 years of traffic noise research. The noise source information for automobiles and for trucks, however, was obtained from more recent studies for California traffic (in lieu of utilizing the original automobile and truck source information from the original model). This information reflects quieter automobile and truck noise sources arising from superior road surfacing on streets and highways throughout California, California's rigid truck noise standards, and general improvements in automobile and tire noise technology since the inception of the model. Individual vehicle noise levels depend upon vehicle type (i.e., car or truck) and speed. Noise

is computed at receiver locations by calculating the further effects of traffic; (i.e., car or truck), distance from the roadway, length of the exposed roadway, and shielding provided by natural or man-made features. In applying the model for the Milpitas Noise Element, the most important parameters are traffic speeds and percentage of trucks. The volume of traffic is also important, but to a lesser degree.

The effects of roadway grades and interrupted flow of traffic are variable and, therefore, add to noise exposure uncertainty in the vicinity of these locations. Noise from vehicles on grades depends upon truck volume, loading of individual trucks, grade percentage, and on truck horsepower. Truck noise on upgrades is greatest when trucks are required to use low gears and high engine revolutions for pulling. When the combination of loading and percentage of grade becomes critical on downgrades, trucks use low gears and high rpms for breaking, thereby generating more noise.

Interrupted traffic flow (i.e., stop-and-go traffic) also depends upon volume and varies with individual driving habits, thereby creating another source of variability in noise modeling. However, the total noise exposure of traffic on streets is approximately the same mid-block as at stopped intersections. This is because the higher speeds mid-block are offset by the deceleration and acceleration required at street corners. Residents living near the street corners, however, tend to complain more of the noise due to its varying nature.

The traffic data for the existing and future condition on Milpitas highways and freeways, primary arterials, and major local streets were provided by the City.

The fillets (i.e., concave junctions) at the intersection of two noise exposure contours represent the numerical addition of the contours.

Railroad Noise Contours

The existing and future level of railroad operations was obtained from interviews with Union Pacific and Southern Pacific railroad personnel in Milpitas. This operational data and the 24-hour measurement results adjacent to the train right-of-way were used to develop the contours. The noise contours take into account locomotive noise, crossing gate warning bells, and horn blasts.

For train operations potentially exceeding 76 daily operations, CalTrans will propose that the railroad be electrified. If the level of operation remains below 76, diesel locomotives would continue. If the railroad were electrified, a new noise study would be required to determine the resulting noise contours. Use of such electrified trains would likely reduce noise exposure.

Union Pacific Railroad operates a major switching yard in Milpitas. There is no schedule for Union Pacific operations nor any limitations on hours of operation. Union Pacific currently may have as many as four trains in Milpitas at once, and the 30 percent increase in yard use in 1988 may be expected to continue.

Southern Pacific Railroad currently averages eight trains per day through Milpitas with no limit on the hours of operation. Trains vary considerably in length. Operational volume through Milpitas has been fairly constant and is expected to remain so in the future.

MEASUREMENT RESULTS

The fourteen measurement locations are indicated in Figure B1. The variation in average and background noise levels for a typical weekday are portrayed in Figures B2, B3, and B4 for the three long-term measurements. The results of the noise measurement program are summarized in Table B. The following is a brief description of the noise environment for each measurement location.

Site 1 was selected to document the typical noise exposure from commuter traffic along this main thoroughfare. Figure B2 shows the average noise levels to be within 5 dB of the background noise levels during daytime hours (7 am to 7 pm). This close correlation indicates steady flow of vehicular activity along I-880. The dip in average noise levels betweeen the hours of 3:00 pm and 7:00 pm is probably due to traffic congestion during the peak commute hour which reduces traffic speed.

Site 2 was selected to document I-880 traffic exposure to existing residences along this freeway. Residences along I-880 have a 10-foot sound wall in the backyard to attenuate traffic noise. A simultaneous measurement at Site 1 was conducted to estimate sound wall effectiveness.

A noise measurement was conducted at Site 3 at the request of the City to document the noise exposure at an undeveloped area that could potentially be rezoned residential. This measurement position was located 600 feet

west of I-880 roadway centerline. The primary noise sources were automobiles along Barber Lane and small aircraft during the measurement period. The A-weighted background noise level of 55 dB was controlled by I-880 vehicular activity.

A measurement was conducted at Site 4, since it also is a possible future residential area. Substantial vehicular activity (1450 vehicles during a 15-minute measurement period) along West Calaveras Boulevard was the primary noise source at this location. The A-weighted background noise level occasionally dropped to 60 dB due to the stoplight at the Cypress Drive Intersection. Trucks generated a maximum A-weighted noise level of 82 dB at the 100-foot microphone setback.

Site 5 was selected to document the typical weekday noise exposure due to vehicular activity along this main thoroughfare. As seen in Figure 3, the diurnal noise variation closely matches that of Figure 2 (I-880) except during the afternoon peak hours. The traffic congestion along I-880 and I-680 during morning commute hours appears to be similar. The depressed roadway south of Route 237 and the sound barriers north of Route 237 attenuate the traffic noise in the backyards of residences located along I-680. Site 6 was selected to document the effectiveness of the 8-foot sound barrier located along I-680. The simultaneous measurement conducted at Site 5 was used to estimate the DNL at Site 6.

A measurement was conducted at Site 7 to document the noise exposure in a typical quiet area of Milpitas. The microphone was located along an unpaved road which leads to a residential construction site. Primary noise sources included distant traffic, airplanes, and occasional horse noises.

Site 8 was selected to document the noise exposure from train activity to residences located alongside the railroad tracks. The maximum A-weighted noise levels of train passbys ranged from 82 to 92 dB at a distance of 200 feet east of the track. The majority of new residential projects located along the railroads incorporate sound walls to control train noise in outdoor use spaces. The A-weighted background noise levels ranged from 41 dB at 1:00 a.m. to 58 dB at 1:00 p.m. Construction noise from a nearby senior housing project contributed to the 24-hour average noise level.

A short-term measurement was conducted at Site 9 to document the noise exposure to residences located along Landess Avenue. Automobile activity was the primary noise source at this location.

A short-term measurement was conducted at Site 10 to document traffic noise in the proposed residential area north of Dixon Landing Road. The average noise levels were controlled by vehicular traffic along Dixon Landing Road. Distant traffic noise from I-880 controlled the A-weighted background noise level of 56 dB.

A short-term measurement was conducted at Site 11 south of the north City limits to quantify traffic noise at the trailer park and residences. Most residences along North Milpitas Boulevard north of Dixon Landing Road have sound barriers.

A short-term measurement was conducted at Site 12 to document traffic noise along East Calavaras Boulevard between I-680 and I-880. Once again, the primary noise source was vehicular traffic.

Site 13 was selected to document traffic noise near single-family homes along Evans Road. At the time of measurement, vehicular activity was low and is reflected in the Leq.

Site 14 is similar to Site 13, although the doubling of traffic activity causes the 3-decibel higher noise levels at Site 14 for the same microphone setback. Primary noise sources were automobiles, motorcycles, and occasional aircraft.

FIGURE B-1 : SITE MAP

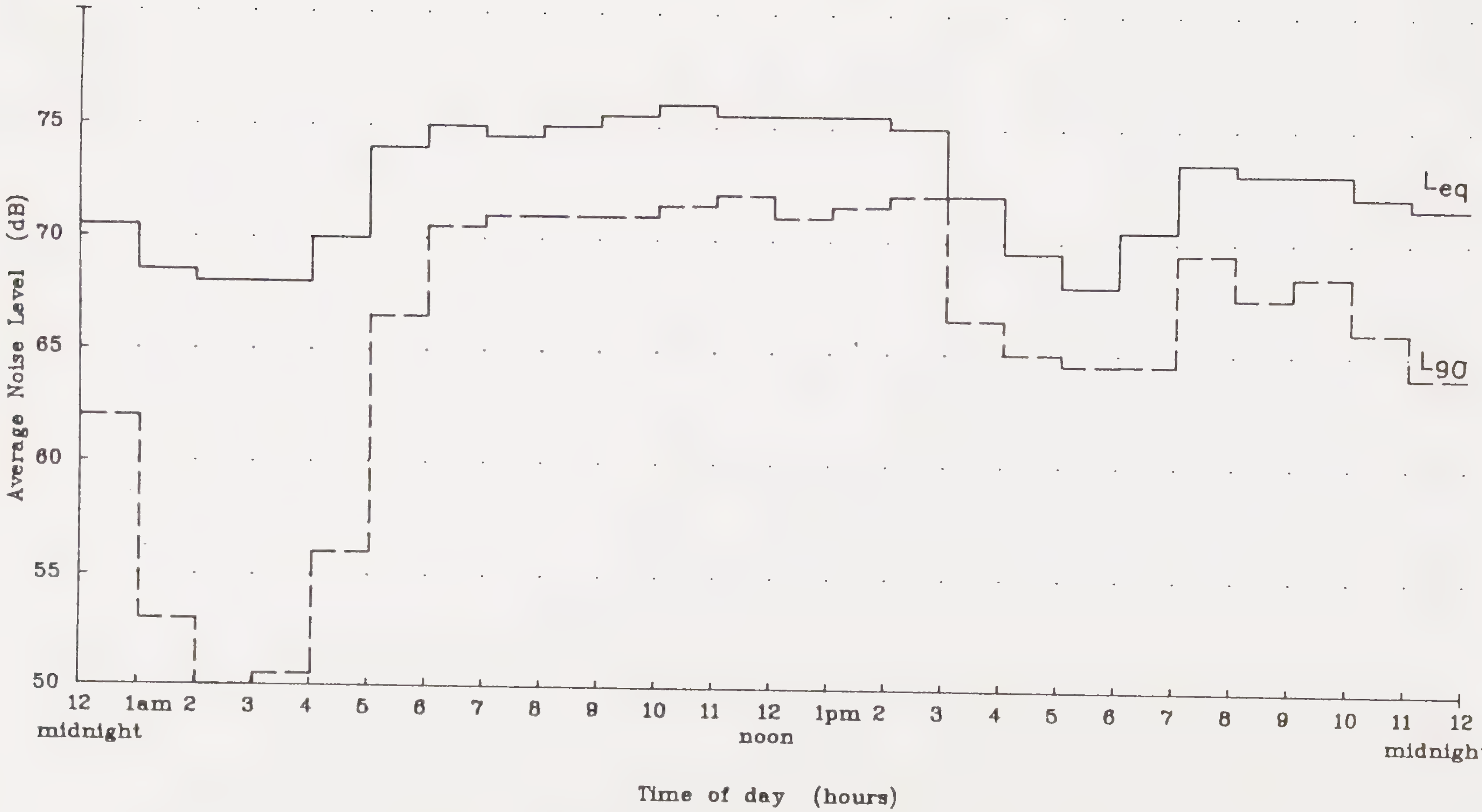


FIGURE B_2 : MILPITAS, I-880, NORTH OF ROUTE 237
27 – 28 JUNE 1988 (L_{dn} =78 AT SITE 1)

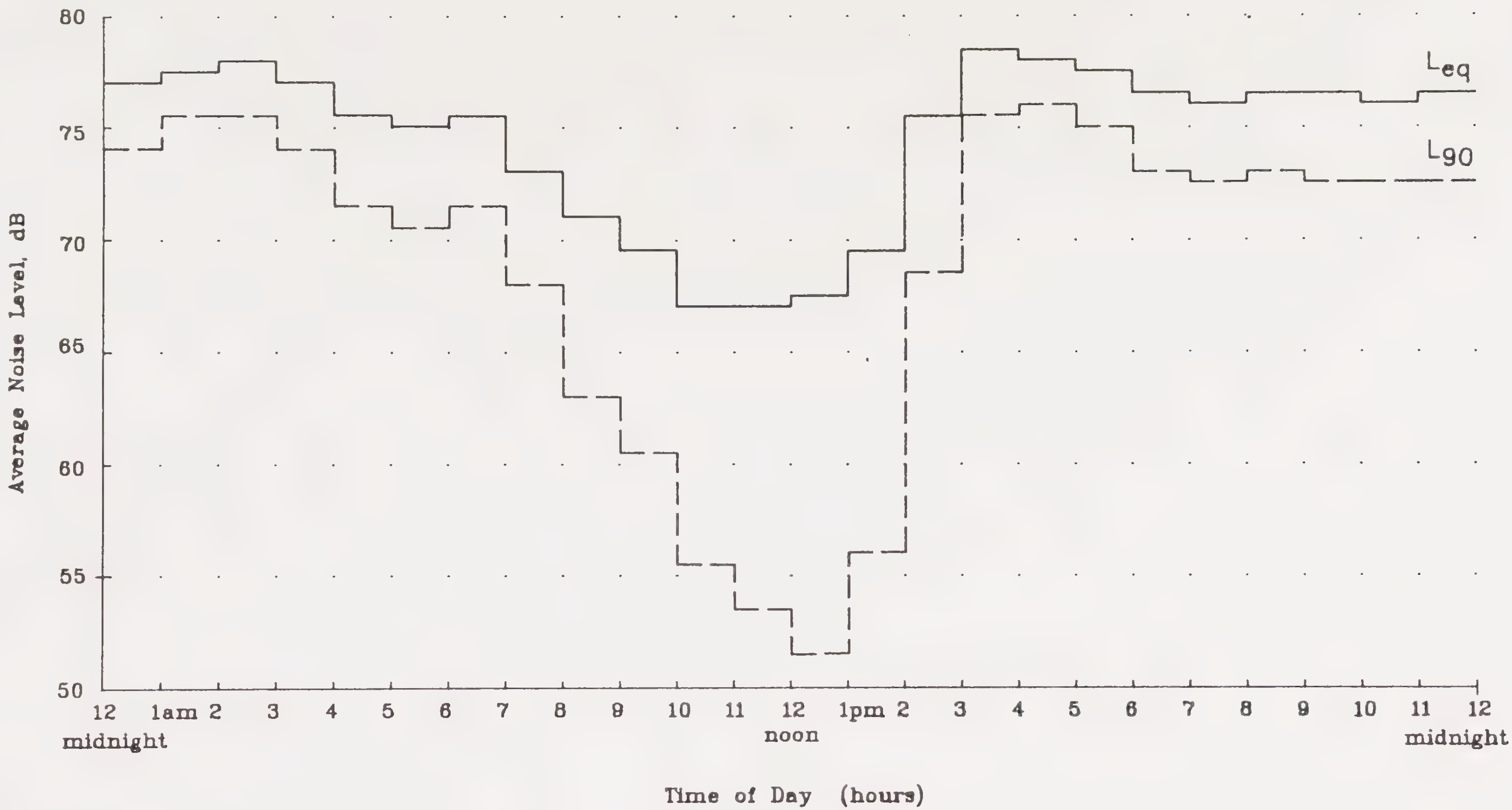


FIGURE B_3: MILPITAS, I680, SOUTH OF E. CALAVERAS BLVD.
27 – 28 JUNE 1988 (L_{dn}

TABLE B: SUMMARY OF NOISE MEASUREMENTS FOR THE CITY OF MILPITAS
(Monday 27 June 1988 - Wednesday 29 June 1988)

Site	Location	Date/Time	A-Weighted Noise Levels (dB) L_{eq}	L_{10}	L_{50}	L_{90}	L_{dn}
1	I-880, 180 feet east of roadway centerline, north of Route 237	27-28 June 1988 Noon	73	--	--	--	78
		27 June 1988 Noon-1:00 pm	76	78	75	71	--
2	I-880, 20 feet east of 10-foot-high soundwall in backyard of 403 Heath Street	27 June 1988 Noon-1:00 pm	66	68	65	62	68*
3	Barber Lane, 50 feet west of roadway centerline, north of fire station	27 June 1988 12:30-12:45 pm	62	66	58	54	66*
4	Route 237, 100 feet south of roadway centerline, east of Cypress Drive	27 June 1988 1:00-1:15 pm	71	74	71	63	74*
5	I-680, 160 feet east of roadway centerline, west of Shirley Drive	27-28 June 1988 3:00 pm	76	--	--	--	80
		27 June 1988 3:00-4:00 pm	77	79	77	74	--
6	I-680, 30 feet east of 9-foot-high soundwall near 333 Moretti Lane	27 June 1988 3:00-4:00 pm	70	72	71	68	73*
7	Vista Ridge Road, 20 feet west of roadway centerline, north of Vista Norte Court	27 June 1988 3:25-3:35 pm	44	48	36	32	--
8	Union Pacific Railroad, 200 feet east of near track, end of Beresford Court	28-29 June 1988 5:30 pm	62	--	--	--	65
9	Landess Avenue, 50 feet north of roadway center-line, across from Paris Way	29 June 1988 5:10-5:25 pm	62	66	53	43	67*
10	Dixon Landing Road, 90 feet south of roadway centerline, across from Milmont Drive	29 June 1988 10:50-11:05 am	68	70	66	60	71*
11	N. Milpitas Blvd., 60 feet west of roadway centerline, across from Firethorn Street	29 June 1988 11:20-11:35 am	63	66	60	53	66*
12	E. Calaveras Blvd., 70 feet north of roadway centerline, west of N. Hillsview Drive	29 June 1988 11:55-12:10 pm	71	75	69	60	75*
13	Evans Road, 40 feet west of roadway centerline, south of Poppy Lane	29 June 1988 12:30-12:45 pm	60	64	49	44	64*
14	Piedmont Road, 40 feet west of roadway centerline, 2271 Mesaverde Dr.	29 June 1988 12:55-1:10 pm	63	68	53	43	66*

*Estimates based on simultaneous monitoring

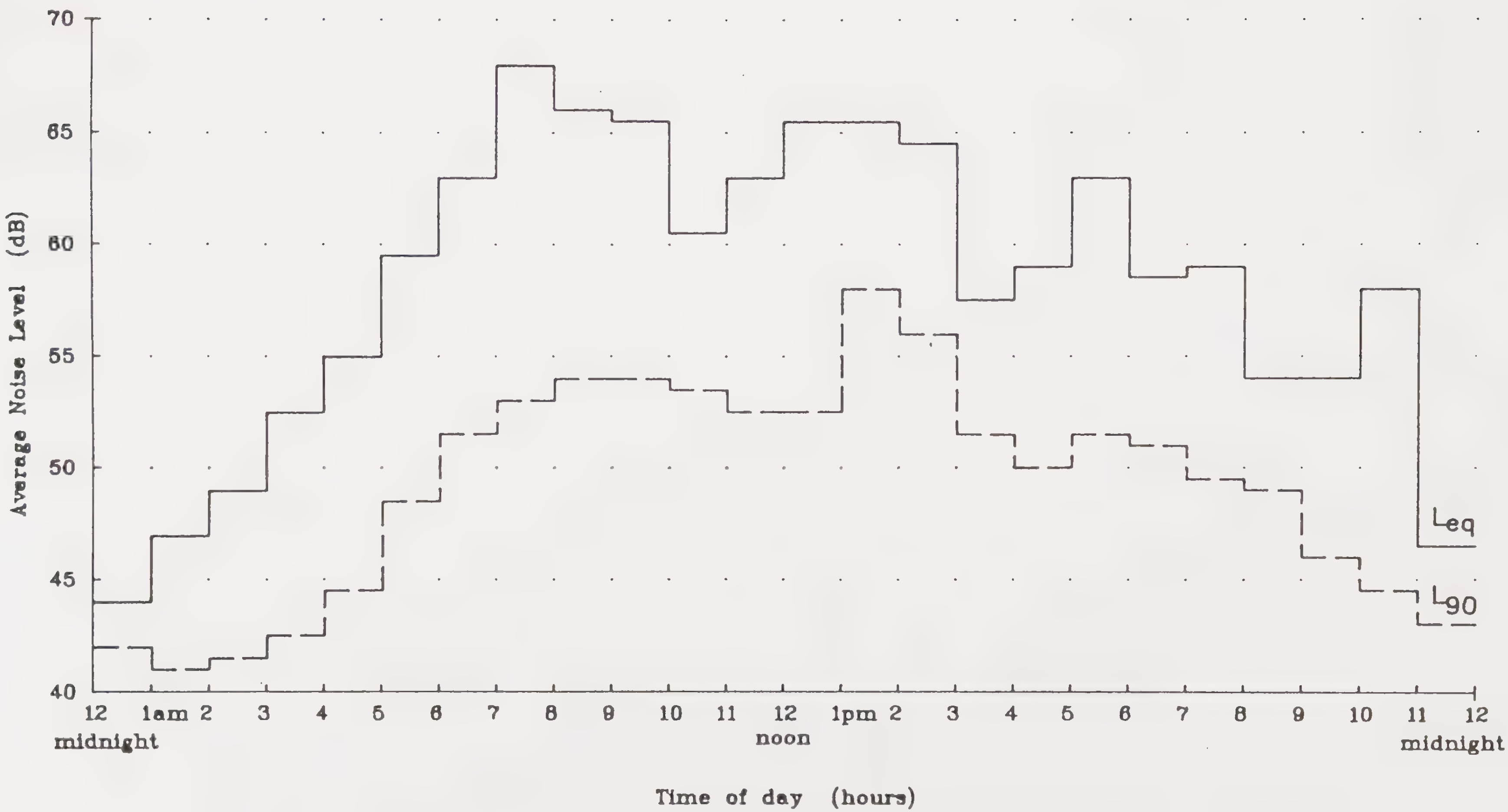


FIGURE B_4: MILPITAS, UNION PACIFIC RAILROAD, NORTH OF ROUTE 237
28 – 29 JUNE 1988 (L_{dn}=65 AT SITE 8)


map 1
CITY OF MILPITAS
CALIFORNIA
BASE MAP - PREPARED BY:
COMMUNITY DEVELOPMENT DEPARTMENT
ENGINEERING SERVICE DIVISION
REVISED: MAY 14, 1988
FUTURE (YEAR 2020)
DAY-NIGHT AVERAGE SOUND LEVELS
Prepared by:
charles m. salter associates, inc.
consultants in acoustics
930 Montgomery Street
San Francisco, CA 94133
tel: (415) 397-0442
fax: (415) 397-0454
LEGEND
DEDICATED STREET PROPERTY LINES
STREET (NOT CITY MAINTAINED)
CITY LIMIT LINE
RAILROAD MAIN LINES
HETCH HETCHY R/W (80' WIDE)
SOUTH BAY AQUEDUCT R/W
P G & E ELECTRIC TRANSMISSION LINES
P G & E GAS TRANSMISSION LINES
IMPROVED CREEKS
UNIMPROVED CREEKS
MATCH LINE
MATCH LINE
RECEIVED


CITY OF MILPITAS
CALIFORNIA
BASE MAP - PREPARED BY:
COMMUNITY DEVELOPMENT DEPARTMENT
ENGINEERING SERVICE DIVISION
REVISED: MAY 14, 1988
EXISTING (YEAR 1988)
DAY-NIGHT AVERAGE SOUND LEVELS
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UNIMPROVED CREEKS
MATCH LINE
MATCH LINE
RECEIVED